

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on March 21, 2002, and the references cited therewith.

Claim 1 is amended and claim 3 is canceled; as a result, claims 1-2, 4-14, 26-32, and 35-39 are now pending in this application.

§103 Rejection of the Claims

Claims 1-14, 26-32, and 35-38 were rejected under 35 USC § 103(a) as being unpatentable over Applicant's admitted prior art in view of Lisenker et al. ((WO 94/19829) or Clark. Although the Examiner cited the Clark et al. reference, the Examiner did not discuss this reference in the Office Action. In a previous Advisory Action, the Examiner dropped the Clark reference. Presented herein are the specific references that teach away from using a deuterium-treated oxide in an erase operation.

As has been discussed, the Lisenker et al. reference does not discuss a use of deuterium for reducing random single bit data loss in a FLASH memory cell or other memory cell. The significance of this difference is that FLASH memory includes a programming operation and an erase operation. Both the programming operation and the erase operation must operate in a satisfactory manner for the FLASH memory to perform acceptably. None of the MOSFET devices, TFT's, polyresistors or polyemitter bipolars operate with this two step operation. Specifically, none of the devices discussed in the Lisenker et al. patent includes an erase operation. Thus, there is no precedent in the references cited by the Examiner for concluding that deuterium substitution would work at all to reduce random single bit data loss in a memory cell. The Lisenker et al. patent application states in the Summary, page 4, lines 36-37 and page 5, lines 1-5, that 'the bond energy of the Si-H and Si-OH bonds is increased by replacing the hydrogen atoms with deuterium atoms. The Si-D and Si-OD bonds thus formed provide completed silicon dangling bonds that are less likely to break when exposed to electrical stresses. Therefore, the deuterium containing devices of the present invention have improved stability, quality, and reliability.' Page 9, lines 11-15 state, "Because deuterated bonds are more stable than their hydrogen-containing counterparts, they ultimately supplant some hydrogenated bounds during

long exposure to deuterium containing compounds.” The feature of a deuterium bond of being less likely to break, described in the Lisenker et al. reference casts doubt on the ability of a deuterium-treated device to “erase” as is required in FLASH memory. Perhaps that is why the Applicant states on page 11, lines 5-8, “Especially preferred devices of this invention are MOS transistors in which the gate oxide-silicon layer contains additional deuterium containing bonds. However, other devices such as bipolar junction transistors are also within the purview of this invention.” The Lisenker et al. reference specifically excluded any device with an erase function.

The Examiner acknowledges that the Lisenker et al reference does not anticipate the claims but states that the reference renders the claims obvious. The Applicant asserts that it is only in hindsight that the “obviousness” becomes apparent. Lisenker certainly didn’t think it was obvious because he did not include FLASH devices in the list of applicable devices—preferred or otherwise.

The Clark et al. reference does not mention FLASH devices either. Column 9, lines 36-45 describes passivation effects and oxide degradation suppression. There is no suggestion that deuterium oxide performs acceptably in an erase operation.

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.116 - EXPEDITED PROCEDURE
Serial Number: 09/382,442
Filing Date: August 25, 1999
Title: METHOD FOR REDUCING SINGLE BIT DATA LOSS IN A MEMORY CIRCUIT

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Dkt: 303.522US1

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 373-6976 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account

No. 19-0743.

Respectfully submitted,

ALAN R. REINBERG

By their Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 373-6976

Date 21 May 2002

By

Janal M. Kalis

Janal M. Kalis

Reg. No. 37,650

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Box AF, Commissioner of Patents, Washington, D.C. 20231, on this 21st day of May, 2002.

Name

Amy Moriarty

Signature

Amy Moriarty

